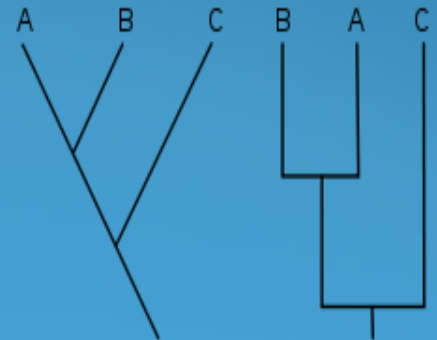


# Taxonomy and Nomenclature

Lepidoptera Course  
Southwestern Research Station  
Portal, Arizona  
8-16 August 2017



# Taxonomy and Nomenclature

## Definitions

- Taxonomy is the process and practice of recognizing and defining categories for the classification of organisms.
- Nomenclature is the names of the categories recognized through taxonomic studies. The correct application of names is guided by the International Code of Zoological Nomenclature.

# Taxonomy

## In Practice

- Taxonomists identify, circumscribe, and name (describe) taxa: orders, families, genera, species.
- We strive to make classifications and categories “natural” (phylogenetic) so that taxonomy has a predictive value.
- To make “natural classifications” we need phylogenies of the organisms in question.

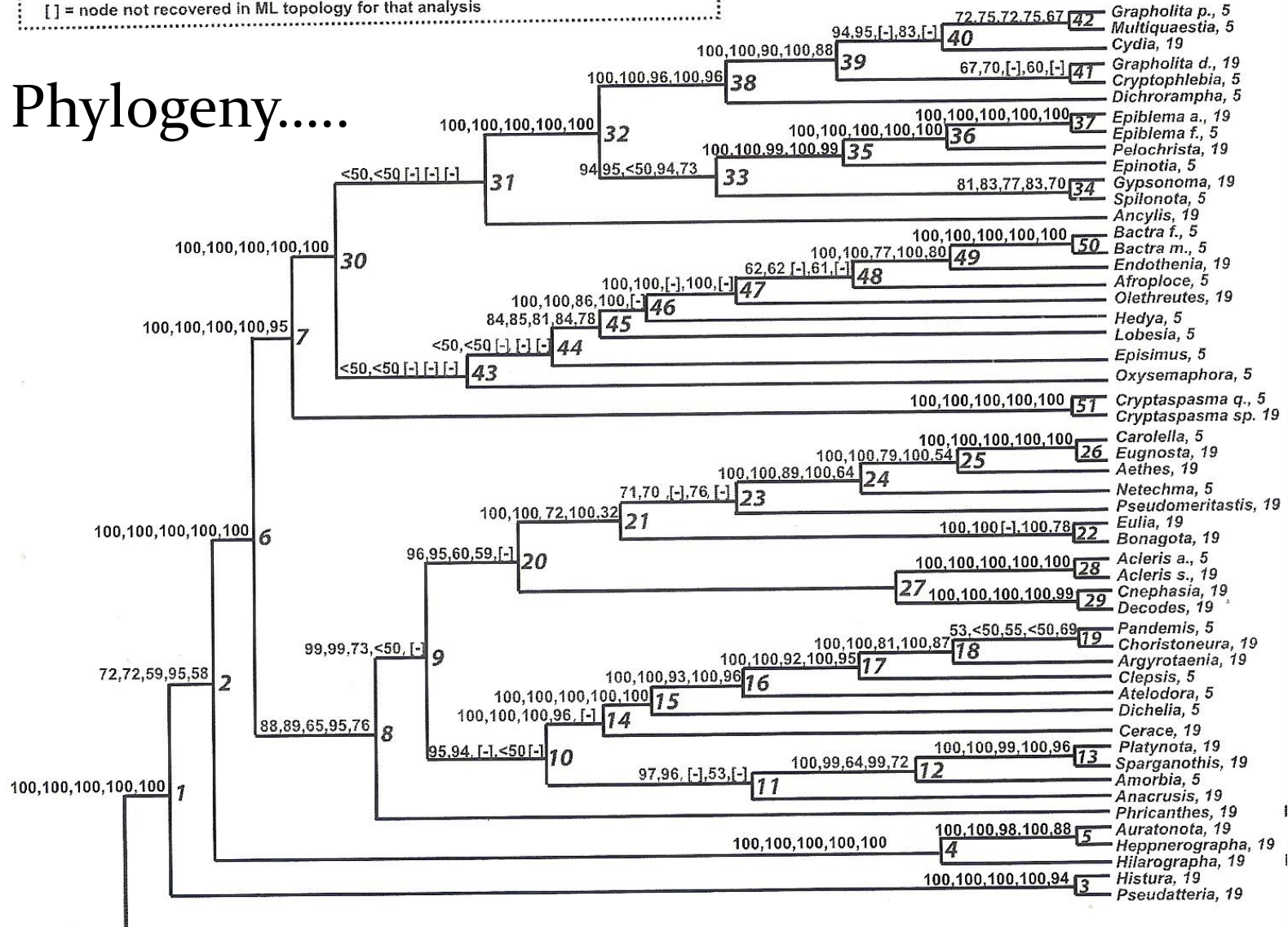
Topology displayed: best ML tree for nt123 (19 gn)

Bootstraps, above branches:

nt 123 (19 gn), nt123\_partitioned (19 gn), degen 1 (19 gn), nt123 (5 gn), degen1(5 gn)

[ ] = node not recovered in ML topology for that analysis

# Phylogeny.....





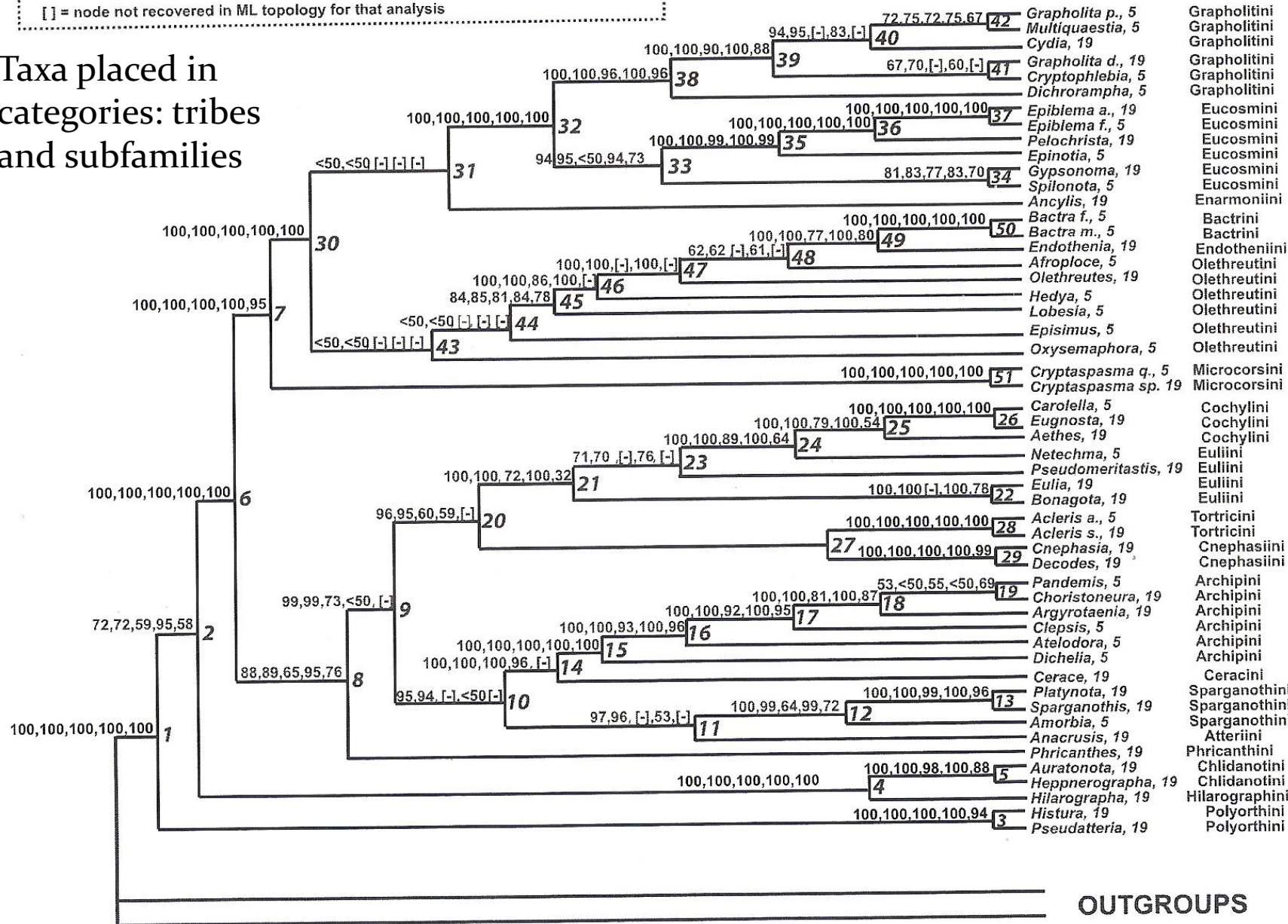
Topology displayed: best ML tree for nt123 (19 gn)

Bootstraps, above branches:

nt 123 (19 gn), nt123\_partitioned (19 gn), degen 1 (19 gn), nt123 (5 gn), degen1(5 gn)

[ ] = node not recovered in ML topology for that analysis

## Taxa placed in categories: tribes and subfamilies



# Taxonomy

## Definitions

	# descr. spp.	Geographic distribution	Predominant feeding mode	Predominant diet breadth (# polyphagous spp./total) & predominant host families (if any)	Predominant egg-laying habit	
Olethreutinae	Grapholitini	898	cosmopolitan	borers in fruits, roots, shoots	oligophagous (32/195 = 16% P)	?singly or small groups
	Eucosmini	1,651	cosmopol., esp. Holarctic	leaf rollers/webbers; borers	oligophagous (52/307 = 17% P)	?singly or small groups
	Enarmoniini	298	cosmop., esp. Orient., Austr.	leaf rollers; borers	oligophagous (16/47 = 34% polyphagous)	?singly or small groups
	Bactrini s.s.	113	mainly Old World	stem borers	oligophagous (1/11= 9% P); Poales, 94%	?singly or small groups
	Endotheniini	52	cosmopol., esp. Holarctic	borers, all plant parts	oligophagous (5*/11 = 45% P); 73% on asterids	?singly or small groups
	Olethreutini s.s.	1,077	cosmopolitan	leaf rollers	polyphagous (97**/189 = 51% P)	?singly or small groups
	Microcorsini	36	S. hemisphere; Oriental	in nuts and seeds	polyphagous (3/4 = 75% P)	?singly or small groups
	Cochylini s.s.	1,028	cosmopolitan	internal feeders (leaf rollers)	oligophagous (14/41 = 34% P); 32% on asterids	?singly or small groups
	Euliini	670	mainly Neotropical	leaf rollers (leaf litter feeders)	polyphagous (11/18 = 61% P)	singly or small groups
	Tortricinae	20	406	cosmopolitan	leaf rollers	polyphagous (60/103 = 58% P)
Tortricinae	Cnephasiini	261	mainly Palearct., Oriental	leaf/flower tiers (miners)	polyphagous (20/32 = 63% P)	singly or small groups
	Archipini	1,623	cosmopolitan	leaf rollers/tiers (dead leaves)	polyphagous (195/281 = 69% P)	large masses
	Ceracini	29	E. Palearct., Oriental	leaf rollers/tiers	polyphagous (4/5=80% P)	masses
	Sparganothini	219	mainly New World	leaf rollers	polyphagous (28/35 = 80% P)	large masses
	Atterini	45	mainly Neotropical	[leaf rollers]	polyphagous (12/12 = 100% P)	large masses
	Phricanthini	21	Austr., S.E. Asia, Madag.	[on bark or foliage]	oligophagous (0/4= 0% P); all on Dilleniaceae	?
	Chlidanotini	76	Neotrop., Orient., Austr.	[borers]	oligophagous (0/1 = 0% P)	?
	Hilarographini	68	pantropical	[borers]	oligophagous (1/3 = 33% P)	?
	Polyorthini	144	Neotrop., Orient., Austr.	[borers; leaf rollers]	oligophagous (2/8 = 25% P); many on Lauraceae	singly or small groups
	Chlidanotinae					

\* 4 of the 5 "polyphagous" species are restricted to asterids

\*\* % polyphagous drops to 49% if Apotomis species feeding only on Salicaceae & Betulaceae are considered oligophagous

# Taxonomy

## The importance of a species name

- The name of a species is the key to unlocking the “treasure chest” of knowledge about that organism..

[Google *Cydia pomonella* – 189,000 results in 0.14 seconds]





# Taxonomy

## The importance of a species name

- Information on geographic distribution.
  - Invasive or native?
- Information of phenology.
  - Multivoltine or univoltine?
- Information on host breadth.
  - Polyphagous or monophagous?
- Information on pesticides.
- Information on parasitoids.





# Taxonomy

## How is a species described?

Consult the scientific literature – monographic treatments, faunal list, catalogs, etc. (and experts).

Examine material in museum and private collections.

Compare your new species to types of described species.

Describe the results of your work (diagnosis, description, designation of type, depository), and provide illustrations.

Submit your paper to a peer-reviewed scientific journal.

After the paper is reviewed, respond to the criticisms of the reviewers.

Submit your revised manuscript.

Receive page proofs.

Wait for publication.

# Nomenclature

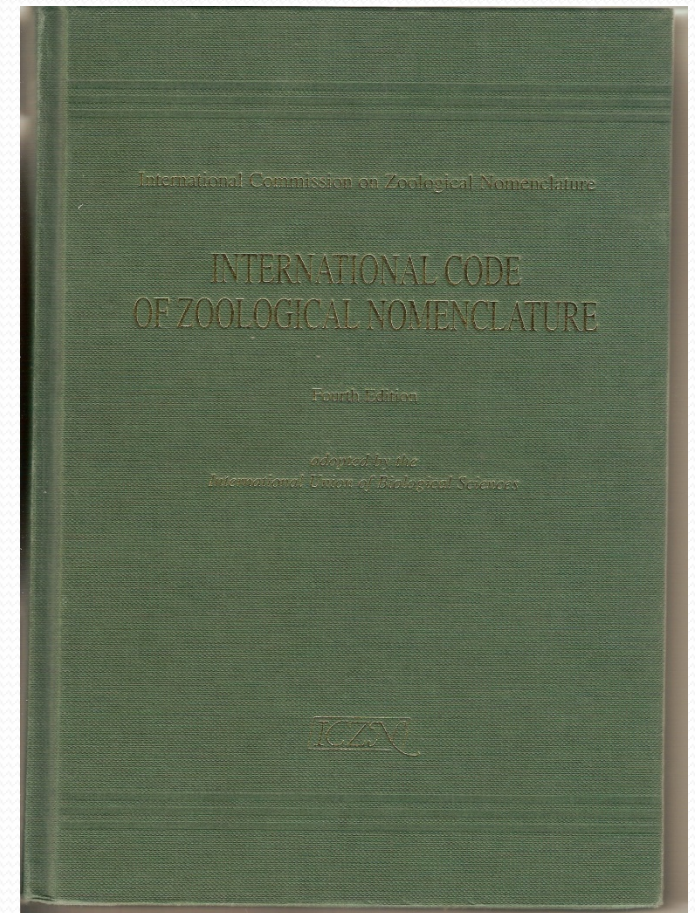
How are species named?

## International Code of Zoological Nomenclature

The name must be published (in a journal or online).

The name must include only characters of the Latin alphabet.

The name must be of Latin or Greek origin (or latinized), or be an “arbitrary combination of letters.”

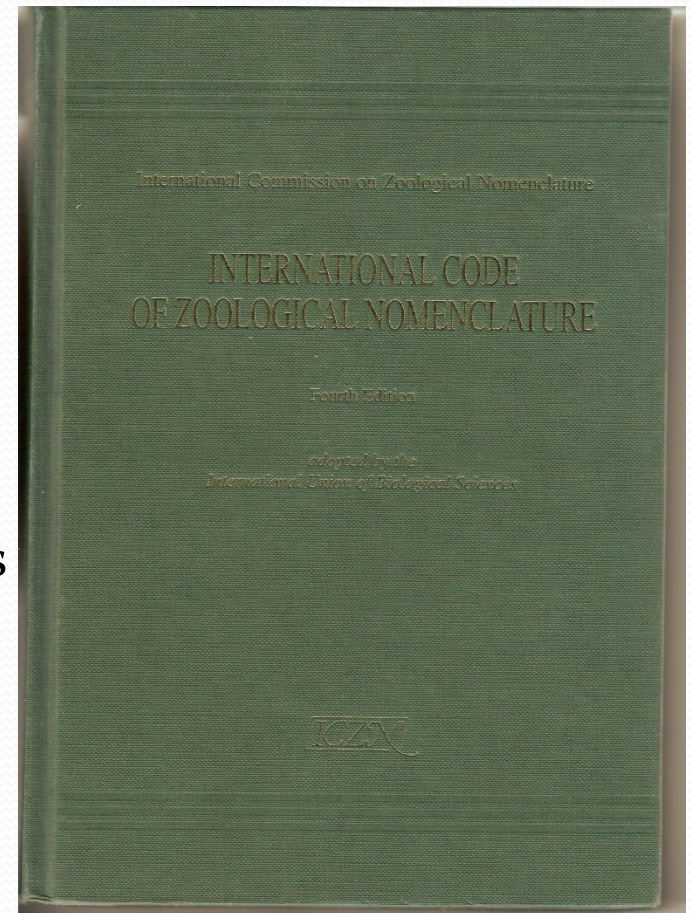


# Nomenclature

How are species named?

## International Code of Zoological Nomenclature

Recommendation 25C: Responsibility of authors forming new names. Authors should exercise reasonable care and consideration in forming new names to ensure that they are chosen with their subsequent users in mind and that, as far as possible, they are appropriate, compact, euphonious, memorable, and do not cause offence.





# Nomenclature

How are species named?

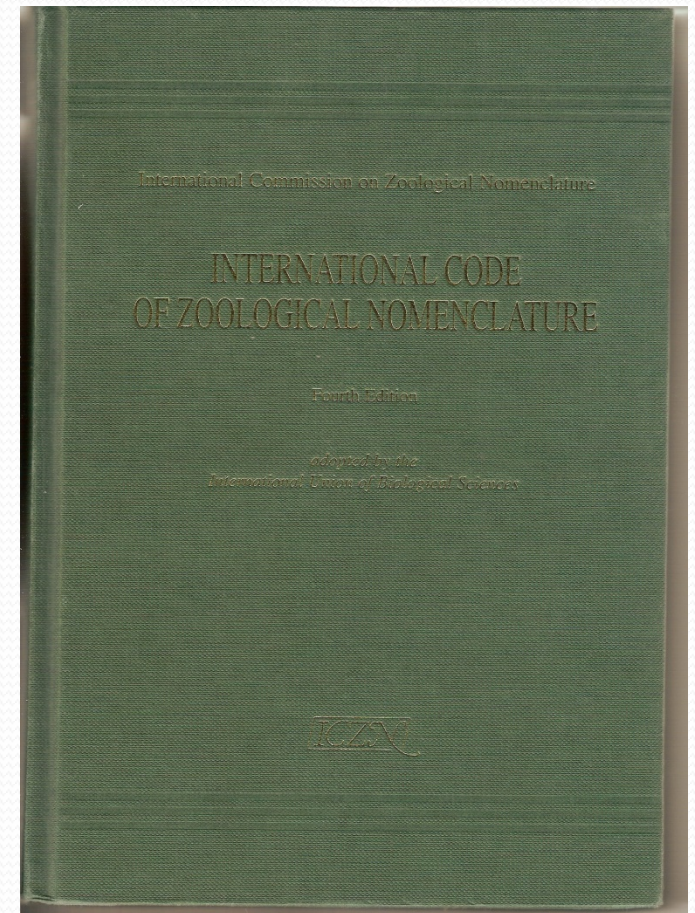
## International Code of Zoological Nomenclature

Patronyms – “i”, “ae” “orum”

*Rhyacionia powelli*

*Cochylis mariae*

*Petrova burnorum*





# Nomenclature

How are species named?

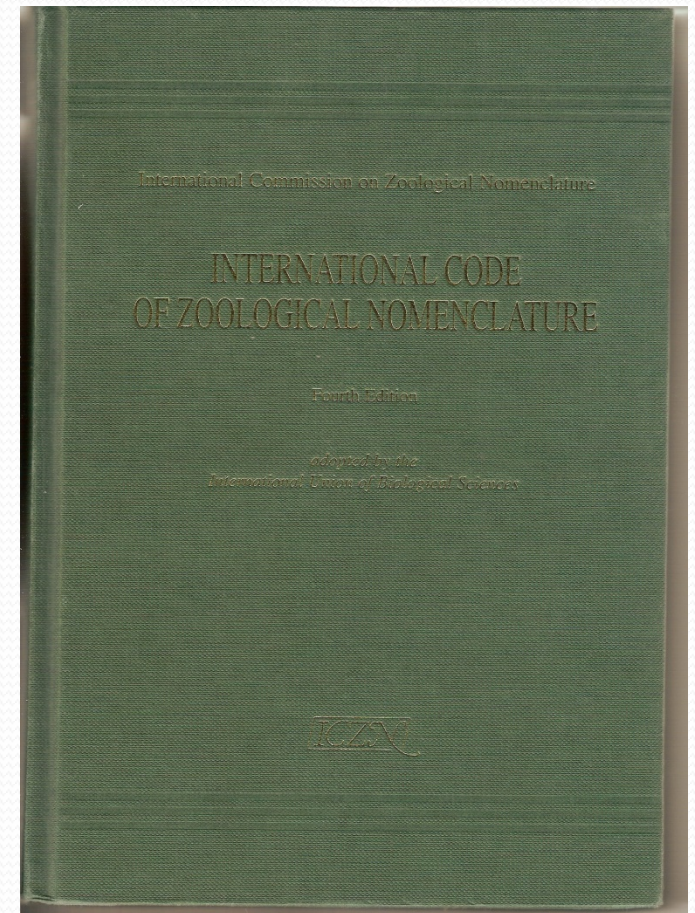
## International Code of Zoological Nomenclature

Patronyms – “i”, “ae” “orum”

Place names – “ensis”

*Eucosma arizonensis*

*Lobogenesis peruviansis*



# Nomenclature

How are species named?

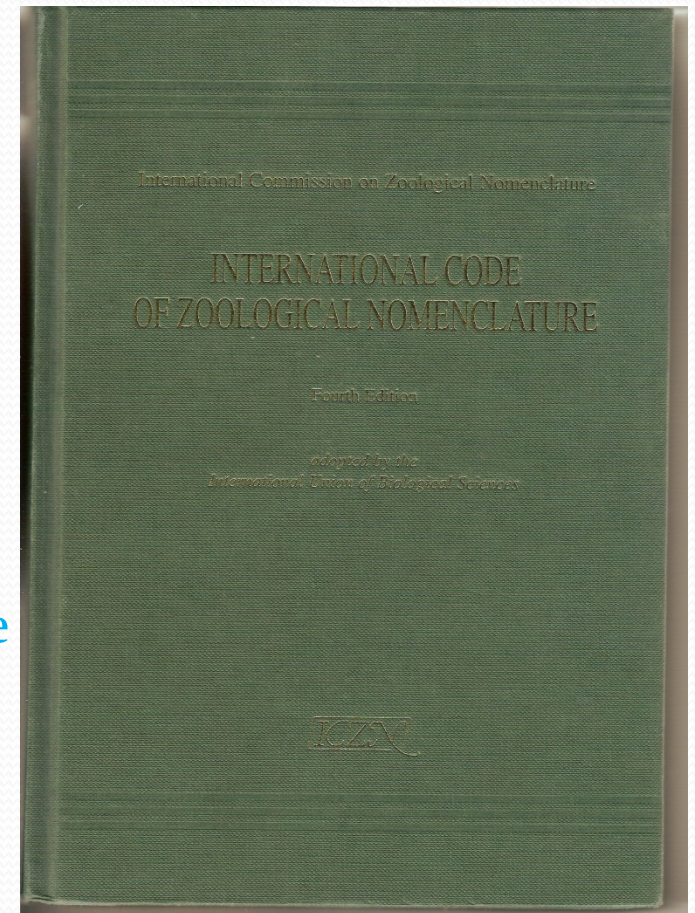
## International Code of Zoological Nomenclature

Patronyms – “i”, “ae” “orum”

Place names – “ensis”

Avoid homonymy

No two species in the same genus can have the same name





# Nomenclature

How are species named?

## International Code of Zoological Nomenclature

Patronyms – “i”, “ae” “orum”

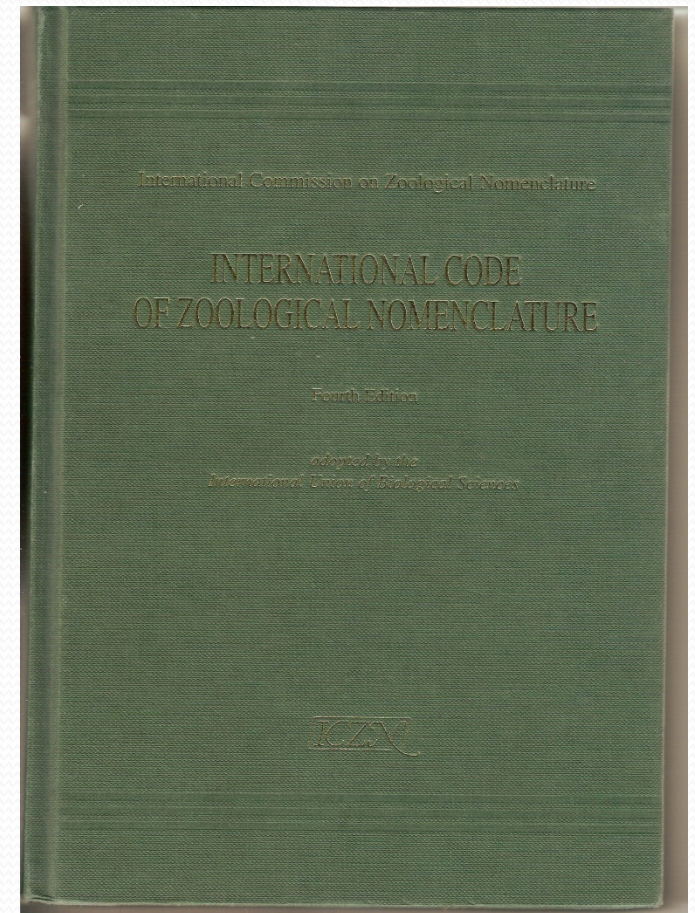
Place names – “ensis”

Avoid homonymy

Tautonymy is okay

*Bison bison*

*Rattus rattus*



# Nomenclature

How are species named?

## International Code of Zoological Nomenclature

Patronyms – “i”, “ae” “orum”

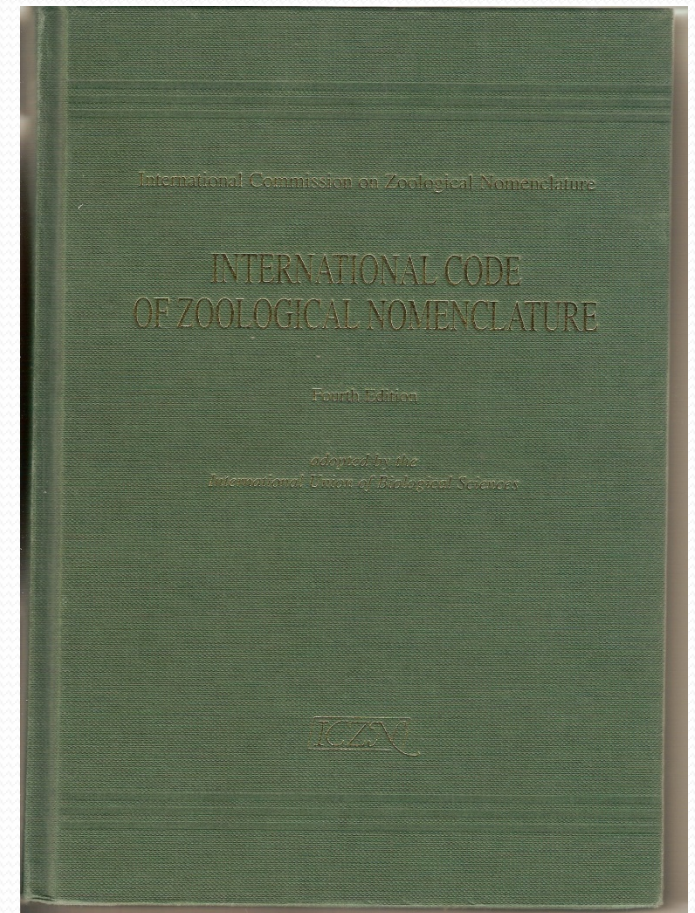
Place names – “ensis”

Avoid homonymy

Tautonymy is okay

Others – “ana”, “ella”, etc.

*A. triangulana*, *C. pomonella*



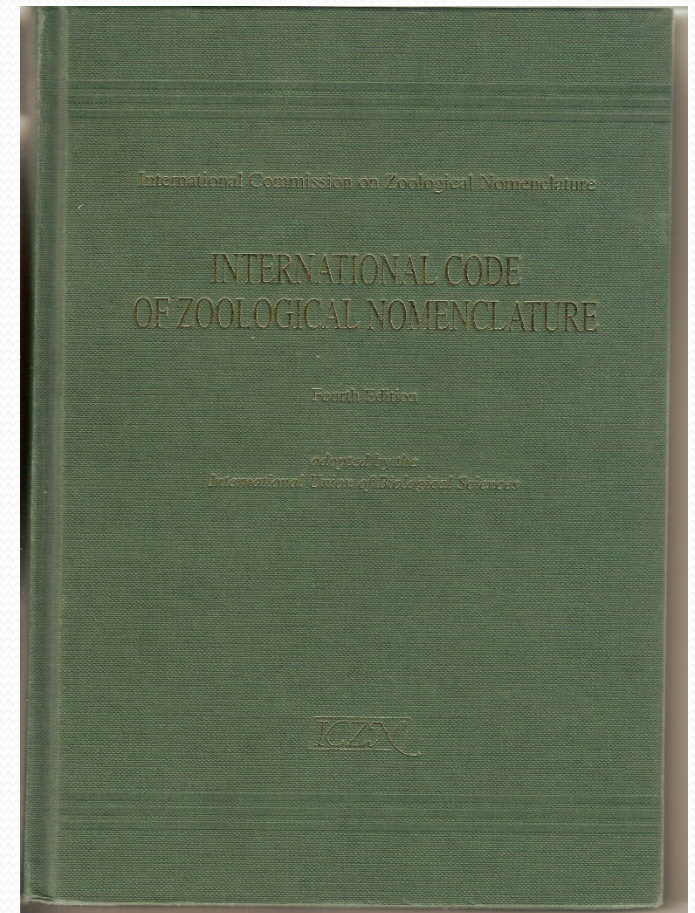


# Nomenclature

## How are species named?

William Kearfott (physician) species names (ca. 1905-1908):

*bobana*  
*cocana*  
*dodana*  
*fofana*  
*gogana*  
*hohana*  
*kokana*  
*lolana*  
*momana*  
*nonana*  
*popana*  
*rorana*  
*sosana*  
*totana*  
*vovana*  
*zozana*

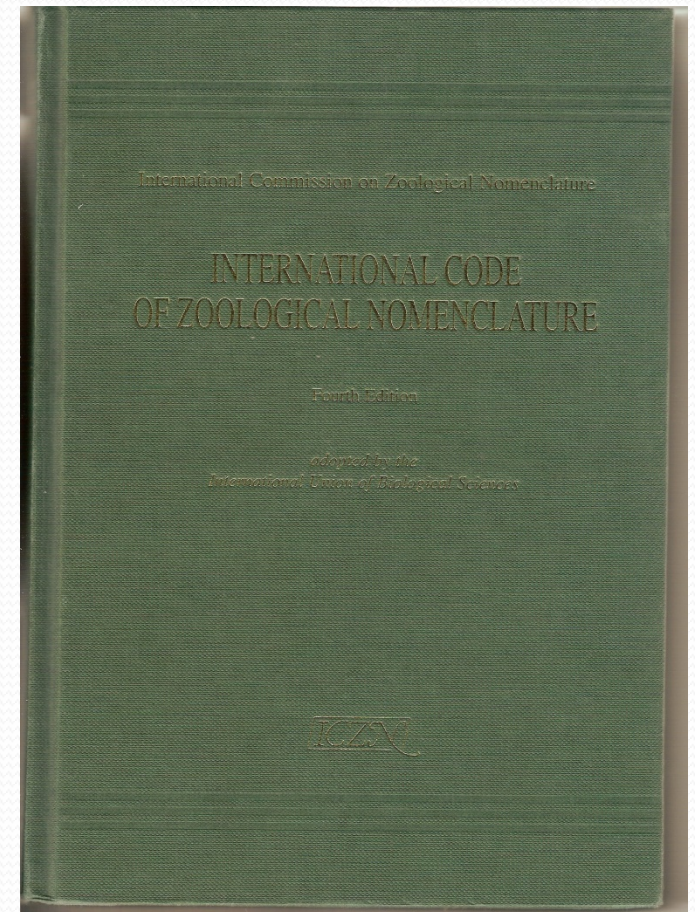


# Nomenclature

## How are species named?

William Kearfott (physician) species names (ca. 1905-1908):

<i>bobana</i>	<i>dandana</i>
<i>cocana</i>	<i>fandana</i>
<i>dodana</i>	<i>gandana</i>
<i>fofana</i>	<i>handana</i>
<i>gogana</i>	<i>kandana</i>
<i>hohana</i>	<i>mandana</i>
<i>kokana</i>	<i>nandana</i>
<i>lolana</i>	<i>pandana</i>
<i>momana</i>	<i>randana</i>
<i>nonana</i>	<i>sandana</i>
<i>popana</i>	<i>tandana</i>
<i>rorana</i>	<i>vandana</i>
<i>sosana</i>	<i>wandana</i>
<i>totana</i>	
<i>vovana</i>	
<i>zozana</i>	



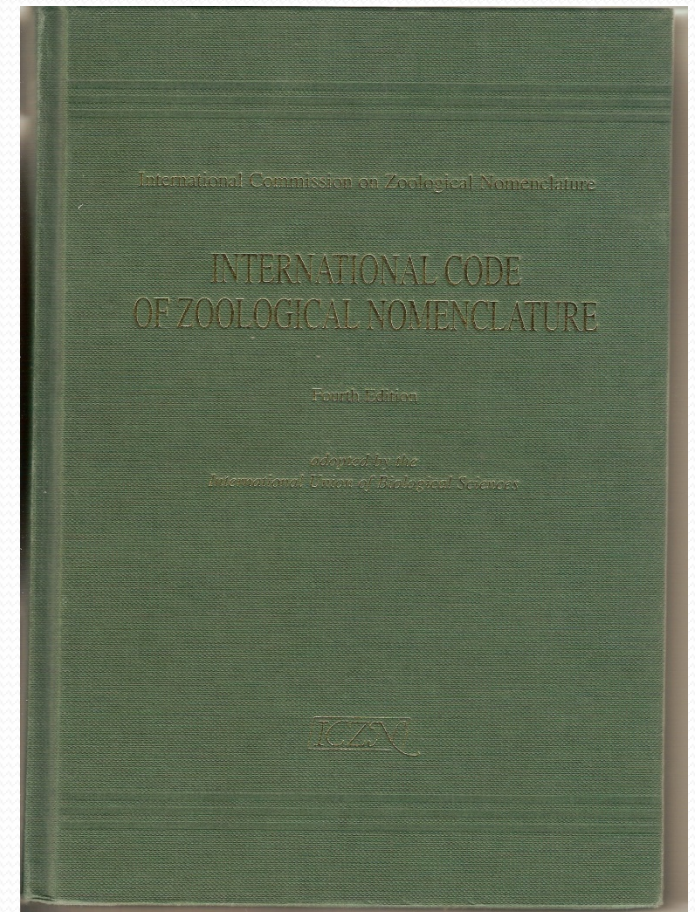


# Nomenclature

## How are species named?

William Kearfott (physician) species names (ca. 1905-1908):

<i>bobana</i>	<i>dandana</i>	<i>baracana</i>
<i>cocana</i>	<i>fandana</i>	<i>caracana</i>
<i>dodana</i>	<i>gandana</i>	<i>daracana</i>
<i>fofana</i>	<i>handana</i>	<i>faracana</i>
<i>gogana</i>	<i>kandana</i>	<i>haracana</i>
<i>hohana</i>	<i>mandana</i>	<i>maracana</i>
<i>kokana</i>	<i>nandana</i>	<i>naracana</i>
<i>lolana</i>	<i>pandana</i>	<i>yaracana</i>
<i>momana</i>	<i>randana</i>	
<i>nonana</i>	<i>sandana</i>	
<i>popana</i>	<i>tandana</i>	
<i>rorana</i>	<i>vandana</i>	
<i>sosana</i>	<i>wandana</i>	
<i>totana</i>		
<i>vovana</i>		
<i>zozana</i>		



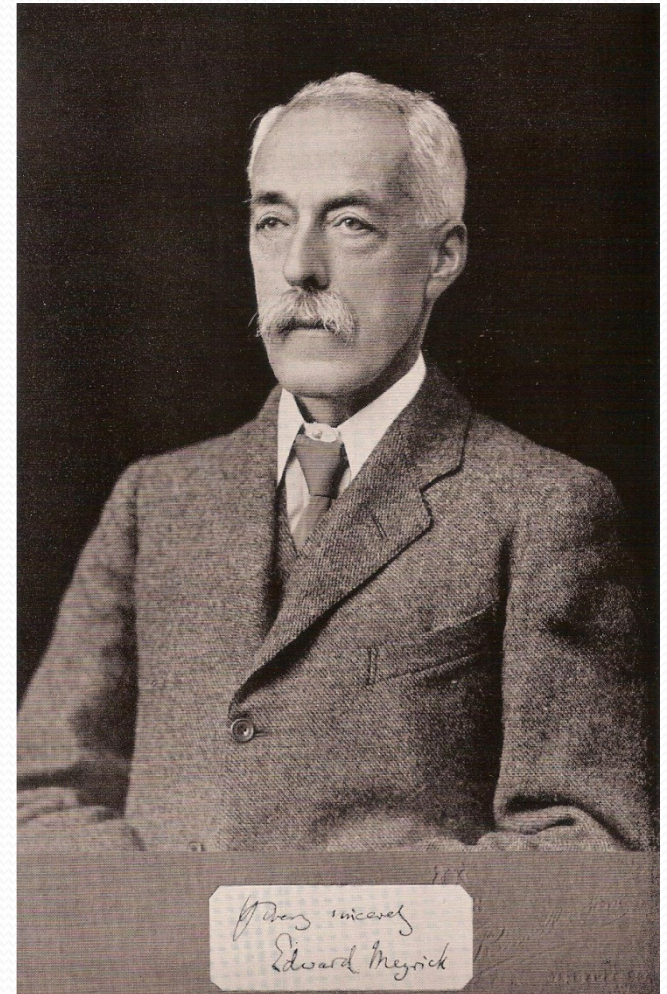
# Nomenclature

How are species named?

Edward Meyrick responded:

“On some impossible scientific names in Micro-lepidoptera.”

“...openly and obviously based on a barbarous and unmeaning gibberish.”





# Nomenclature

How are species named?

Some interesting combinations of genera and species:

*Abra cadabra* – fossil mollusk

*Agra vation* – carabid beetle

*Ah ha* – Australian vespid wasp

*Pieza pi* – fly

*Pieza rhea* – fly

*Pieza kake* – fly

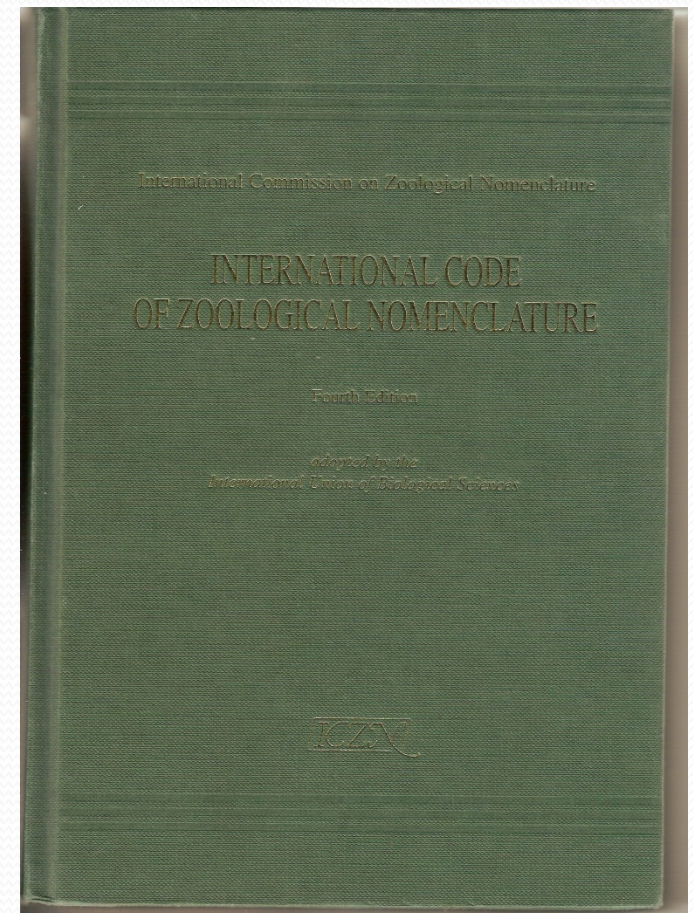
*Pison eu* – Central American wasp

*Eubetia bigaulae* – tortricid moth

*Oedipus complex* – salamander

*Ytu brutus* – water beetle

*Heerz tooya* – braconid wasp



# Nomenclature

How are species named?

Some interesting genera:

*Batman* – fish

*Oops* – beetle

*Sayonara* – fish

*Eurygenius* – small beetle

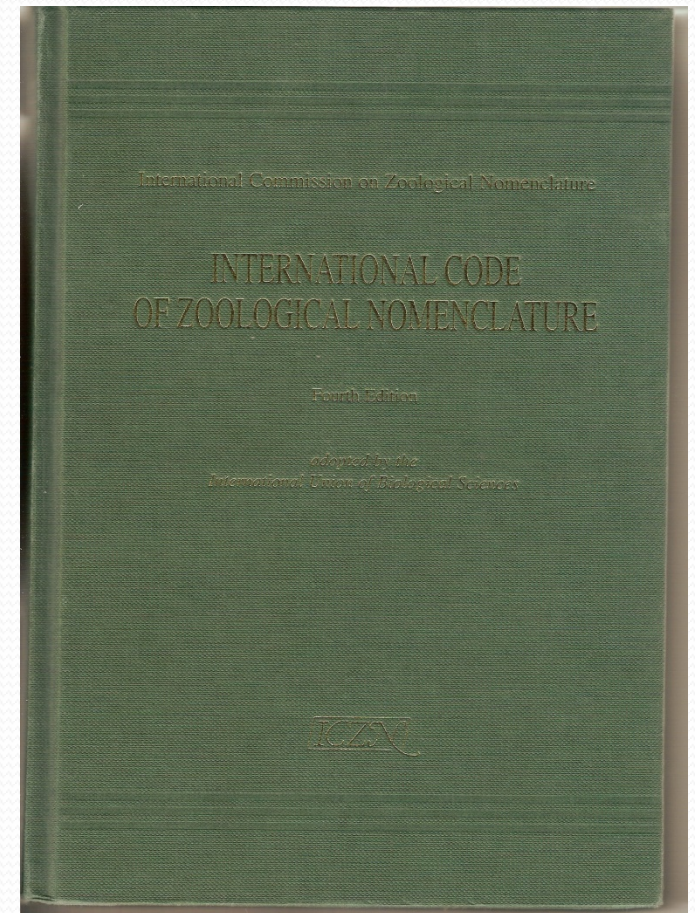
*Dyaria* – moth

*Peggichisme* – true bug

*Polychisme* – true bug

And the family:

Serendipidae Evenhuis, 1994 – fossil fly



# Nomenclature/Taxonomy

one more thing – taxon endings

Superfamily always ends in –oidea  
(Tortricoidea, Pyraloidea, Noctuoidea)

Family always ends in –idae  
(Tortricidae, Pyralidae, Noctuidae)  
(tortricids, pyralids, noctuids)

Subfamily always ends in –inae  
(Tortricinae, Pyralinae, Noctuinae)

Tribe always ends in –ini  
(Tortricini, Pyralini, Noctuini)

